

IN THE CLAIMS:

1. (Twice Amended) A reversible physiological process for temporal separation of oxygen evolution to avoid deactivation of hydrogenase in the presence of oxygen and sustain photosynthetic hydrogen production in cells of an algal microorganism, comprising:

(a) growing a culture of [the] cells of [the] algal microorganism in a medium under illuminated conditions to accumulate an endogenous substrate;

(b) depleting a nutrient selected from the group consisting of sulfur, iron, and/or manganese from the medium until the culture of cells of algal microorganism becomes anaerobic and sealing the culture from atmospheric oxygen; ? still indefinite.

(c) measuring the rate of cellular respiration of a sample of cells of the algal microorganism from step (b) in the dark with an O<sub>2</sub> electrode;

(d) incubating a sample of the algal microorganism from step (c) in light of saturating intensity of yellow actinic excitation, and measuring the light-saturated rate of O<sub>2</sub> evolution with an O<sub>2</sub> electrode;

(e) inducing reversible hydrogenase through photosynthesis by controlling the light saturated rate of oxygen production from the culture of cells of algal microorganism of step (b) so that it is equal to or less than a rate of cellular respiration; and

[(e)](f) collecting an evolved gas that includes hydrogen.